there is also nothing in these astronomical changes to intensify the moist (principally westerly) winds in winter, there will also not be a greater quantity of snow falling at that season in regions having a regular covering of snow in winter. The greater heat and rarefaction of the air in the interior of continents in summer will cause the air of the oceans to flow thither with greater force, and such a movement of the air is favourable to more abundant summer rains than are experienced now, and thus to a melting of the snow in mountainous countries.

Thus it would seem that winter in aphelion during high eccentricity would have rather the opposite effect to that which is generally attributed to it, but it seems to me that the effect would be in any case but slight, and not by far to be compared to that of the distribution of land and sea, mountains and lowlands; in other words, to that of the geographical conditions. With the change of these the extent and distribution of snow and ice must change also.

An attentive study of the physical geography of the earth and of its influence on climates, together with a judicious application of the simplest physical theories, will enable us to gain by and by a better knowledge of geological climates. The problem is an arduous one, but now that the studies are directed in the right way, there is no doubt of the final success.

A. WOEIKOF

UNIVERSITY AND EDUCATIONAL INTELLIGENCE

AT a recent meeting of the trustees of the Mason College in Birmingham, the executors of Sir Josiah Mason presented a statement showing the amount to which the college will be entitled under the will of Sir Josiah Mason. After paying claims on the estate and providing for legacy duty, about 20,000*l.* will accrue to the college within the next three years, and after certain life interests are satisfied, a further sum of about 15,000*l.* will be available, making a total of 35,000*l.* for the estate. The benefactions of Sir Josiah Mason to the college building, endowment, and legacies will then amount to a total of 210,000*l.* The building and endowment of the orphanage and almshouses represent a sum of about 260,000*l.*

IN our University Intelligence last week, in the paragraph relating to Prof. MacAlister's lectures, the word *chemical* should have been *clinical*.

SCIENTIFIC SERIALS

The American Naturalist, December, 1881, contains—F. M. Endlich, on Demerara.—C. E. Bessey, a sketch on the progress of botany in the United States in 1880.—J. D. Caton, the effects of reversion to the wild state in our domestic animals.—W. R. Higley, on the microscopic and general characters of the peach tree affected with the "yellows" (concluded).—W. H. Dall, on intelligence in a snail.

January, 1882.—S. A. Forbes, on the blind cave-fishes and their allies (a new species of Chologaster, *C. papilliferus*, from a spring in Southern Illinois, is described).—Dr. C. F. Gissler, on a singular parasitic Isopod (*Bopyrus palæmoneticola*, Packd.), and on some of its developmental stages (this interesting species, which is figured, was found on about 10 per cent. of the common prawns (*Palæmonetes vulgaris*) examined.—William Trelease, on the heterogony of *Oxalis violacea*.—J. M. Anders, Forests, their influence upon climate and rainfall.—A. S. Packard, jun., glacial marks in Labrador (with a plate).

THE last number of the *Journal of the Russian Chemical and Physical Society* (vol. xiv. fasc. 1) contains, besides the minutes of proceedings, papers on the constitution of compounds of the indigo group, by M. Lubavin; an interesting paper on the influence of molecular weight of homologues in the so-called incomplete reactions, by Prof. Menshutkin; on Caucasus naphtha, by MM. Markovnikoff and Ogloblin; on the distribution of magnetical currents, by M. Sloughinoff; and on the electromagnetic theory of light of Wm. Maxwell, by M. Borgman.

SOCIETIES AND ACADEMIES

LONDON

Royal Society, January 26.—"An attempt at a Complete Osteology of *Hypsilophodon Foxii*," by J. W. Hulke, F.R.S. Abstract.

After a reference to papers descriptive of parts of the skeleton of this dinosaur, by Professors Owen, Huxley, and himself, the author gives a detailed description of the skull, vertebral column, shoulder, and hip-girdles, with their appendages. The skull is essentially lizard-like, both in its general form and in its structural details. The frontal is a paired bone. The premaxillæ send upwards mesial processes separating the external nares; the exclusion of the maxilla from these nares by the external ascending process of the premaxilla is apparent more than real, since the maxilla is prolonged forwards beneath this process, and comes into close proximity to the nostril. The supra-occipital enters into the foramen magnum. The palate fissured nearly in its whole length is strictly lacertilian. The presence of simple cylindrical teeth in the premaxillæ, of small, compressed teeth in the front of the maxilla and in the mandible, and of larger, more complex, compressed teeth behind these, foreshadow the incisors, premolars, and molars of the higher vertebrates. The vertebræ are opisthocœlous in the neck, planocœlous in the trunk and loins, and amphicœlous in the tail. In the neck and thoracic region of the vertebral column the ribs are forked. In the loins a simple unforked riblet is anchylosed to the end of the transverse process. The sacrum comprises five vertebræ. The ilium has a very long preacetabular process. The femur is shorter than the tibia; the inner trochanter is long and acutely pointed. The tibia has a stout præcnemial crest. The tarsus consists of two bones that together form a sinuous hollow upper surface, in which the tibia and fibula rest; the outer bone representing the os calcis supports both bones of the leg, whilst the inner, representing the astragalus, bears the tibia only. In two feet evidence of two elements of a distal row of tarsalia was found in the outer side of the foot. There are four functional toes with 2, 3, 4, 5 phalanges counting from the inner side of the foot, and a styliform rudiment of an outer metatarsal, devoid of phalanges. This alone demonstrates the generic distinctness of *Hypsilophodon* from *Iguanodon* in which, as is well known, the hind foot comprises only three functional toes. The ungual phalanges are sharply pointed. The sternum is rhomboid. The scapula and coracoid have a general resemblance to those of Iguanodon. The humerus has a considerable deltoid crest, and is shorter than the femur. The radius and ulna are shorter than the humerus. The ungual phalanges of the digits resemble those of the hind toes, but are smaller.

Physical Society, February 25.—Prof. G. C. Foster in the chair.—New Members: Prof. G. F. Fitzgerald, Trin. Col. Dublin, Mr. C. Richardson, Lieut. H. J. Dockrell, R.N., Mr. W. Ford Stanley, General H. Hyde, R.E., Mr. J. Buchanan.—Prof W. E. Ayrton, F.R.S., read a paper on Faure's accumulator, giving the results of experiments made by him and Prof. Perry on the efficiency, storing-power, and durability of the battery. The efficiency was got by measuring the power put in, and comparing it with that taken out, by means of Perry and Ayrton's voltameter and ammeter. The authors found that the cell has great resuscitating power if left insulated after all the current appears to have been discharged. Care had to be taken to see that the cell was quite discharged by letting it stand on open circuit for intervals and discharging between whiles. When this was done they found that the total loss for charges up to one million foot pounds need not be greater than 18 per cent. With slower charges they got a loss of only 10 per cent. As to the storage, a mean current of 18 amperes gave, after eighteen hours' discharge (six hours on three consecutive days), 1,440,000 foot pounds of work equivalent to 1 horse-power in forty-three minutes. The cell contained 81 lbs. of red lead, thus making a capacity of about 18,000 foot pounds per lb. of red lead. The cell showed no deterioration after two months of work.—Prof. Ayrton then described a new form of his dispersion photometer, which greatly reduces it in size and convenience. The principle of this instrument has already been described to the Society by the author. It consists in using a concave lens to disperse the stronger light, and thus obviate the necessity of putting it at a great distance if it is very powerful, such as an electric light. The powers of the two lights are compared by the eye in estimating the intensity of the shadows of a rod thrown on a white screen of blotting-paper by the two lights simultaneously. A sperm candle is used as the standard, and it is placed on a movable stand at an angle to the path of the other beam through the lens. Both the lens and candle can be shifted to and from the screen along a scale giving their distances, and the stronger beam is reflected from a small mirror. This mirror is ingeniously fixed so as to reflect the ray from the

same part of its surface whatever angle it is placed at, and thus the power of an electric light can be accurately given for every angle along which the ray travels from the lamp. Observations are taken through red and green glasses to get a better measure of the power of the light. Prof. Ayrton has found that ordinary air absorbs the green rays of the electric light very strongly, and hence, in order to get a proper test of an electric lamp, the photometer should not be far from the light. The new dispersion photometer shown is the only one admitting of this precaution. Mr. Shoolbred stated that he had found from experiment that the carbons of the Swan and Maxim incandescent lamps bore a much higher current without breaking when fed from a Faure accumulator than from a dynamo-electric machine. Prof. Ayrton corroborated this statement, and said that he had obtained a light of 800 candles from a Maxim lamp fed by an accumulator.—Prof. Sylvanus Thompson then read a paper on the electric resistance of carbon under pressure. It was generally stated that the resistance of carbon diminished under pressure, but he had found from recent experiments that the diminution observed was really due to the contact between the electrodes and the carbon. Under pressure there are more points of contact between the metal and carbon than without pressure. The result has an important bearing on the action of the carbon relay, rheostat, and microphone transmitter.—Prof. Ayrton pointed out that as carbon apparently diminished in resistance under a rise of temperature, this would seem to indicate it as a compound substance, since only simple substances seemed to increase in resistance with rise of temperature. Prof. Guthrie recalled that Dr. Moser had suggested that the alteration of the resistance of selenium under light was an effect of contact.—A paper by Mr. G. Gore was read, on the influence of the form of conductors on electric conductive resistance. His experiments were designed to show whether there was a difference of resistance in certain liquid conductors under the positive and negative current. None was discovered.—Dr. Hopkinson, F.R.S., read a paper on the refractive index and specific inductive capacity of transparent insulating media. He inferred from tried experiments and the electromagnetic theory that glass had a high refractive index for rays of very long wave-length. Dr. J. H. Gladstone suggested that the point should be tested by experiment, and that the method of photographing the red rays might be employed.—Mr. J. Macfarlane Gray explained that an objection to one result of his former communication to the Society, on the specific heat of steam, was really a confirmation of it, as Regnault's value was erroneous.

Chemical Society, February 16.—Prof. Roscoe, president, in the chair.—During the evening it was announced that the Council proposed Dr. Gilbert as the president for the coming year, Dr. Schunck and Mr. Griess as vice-presidents, and Drs. Atkinson and Japp, Capt. Abney, and Mr. O'Sullivan, as Members of Council, instead of Dr. Tidy and Messrs. Carteighe, Roberts, and Warington.—The following papers were read:—On benzylphenol and its derivatives, Part 2, by E. Rennie. The author has obtained and studied the following derivatives:—benzylphenol-sulphonic acid, mononitrobenzylphenol, amidobenzylphenol, dinitrobenzylphenol, nitrobromobenzylphenol. The same nitrobromo derivative is obtained whether nitric acid acts on the potassium bromosulphonate or bromine acts on the potassium nitrosulphonate. The formulæ of these substances must therefore be symmetrical. Benzylphenol is therefore a para derivative. The author quotes other evidence in support of this view.—On the Buxton thermal water, by J. C. Thresh. The author has made a most complete analysis of this water, and gives full details as to the methods employed.—On retrograde phosphates, by F. J. Lloyd. It has been long known that in some superphosphates the percentage of soluble phosphate originally present gradually decreases. The phosphate which has become insoluble is termed retrograde phosphate. The author has compared the different solutions recommended by Fresenius, Petermann, &c., for extracting these phosphates; he concludes that a cold ammoniacal solution of ammonium citrate containing 30 per cent. of citric acid is the most suitable solvent.—Contributions to the knowledge of the composition of alloys and metal work, for the most part ancient, by W. Flight. This paper contains analyses of some copper nickel coins of Bactria; some coins of ancient India, about 500 B.C., containing silver, copper, lead, &c.; a figure of Buddha, containing 4 per cent. of silver chloride; "Bidrai" ware and "Koft Gari" work from India; some iron and bronze implements from the Great Pyramid; copper spear-heads from Cyprus; a Hebrew shekel, various old Roman bronzes, &c.—On the dissociation of chlorine, by A. P. Smith and W. B. Lowe. The authors consider that their experiments prove that 1 gramme of chlorine at 6° C. becomes 0·744 grm. of chlorine at 1030° C.

Meteorological Society, February 15.—Mr. J. K. Laughton, M.A., F.R.A.S., president, in the chair.—The following gentlemen were balloted for and duly elected Fellows of the Society:—W. Aronsberg, J.P., W. G. Birchby, J. Rand Capron, F.R.A.S., P. Crowley, F.Z.S., W. W. Culcheth, M.Inst.C.E., D. Cunningham, M.Inst.C.E., F.S.S., S. Cushing, W. N. Greenwood, E. Kitto, J. Mansergh, M.Inst.C.E., G. Oliver, M.D., H. S. H. Shaw, Assoc.M.Inst.C.E., G. W. Stevenson, M.Inst.C.E., F.G.S., and W. H. Tyndall.—The papers read were:—Notes of experiments on the distribution of pressure upon flat surfaces perpendicularly exposed to the wind, by C. E. Burton, B.A., F.R.A.S., and R. H. Curtis, F.M.S. In the present state of aero-dynamics it seems to be impossible to make an *a priori* investigation of the distribution of pressure on a surface exposed to the impact of the fluid in motion without introducing such limitations as render the solutions arrived at widely divergent from the results obtained by the experiments hitherto made. The authors therefore proposed to themselves to attack the problem from the experimental side only, by a method which, as far as they know, has not been applied in the case of air, viz. the application of Pitot's tube, suitably modified in form to the simultaneous measurement of the pressures at the centre and at any en-centrically situated point of a pressure plate of known dimensions. The results of the preliminary experiments are given in the present paper.—The principle of New Zealand weather forecasts, by Commander R. A. Edwin, R.N., F.M.S.—The high atmospheric pressure of the middle of January, 1882, by H. Sowerby Wallis, F.M.S.—The electrical thermometer lent by Messrs. Siemens' Bros. for observing the temperature of the air at the summit of Boston Church Tower was also exhibited.

EDINBURGH

Royal Society, February 6.—Prof. Balfour, vice-president, in the chair.—Mr. John Aitken, in a paper on the Colour of the Mediterranean, and other waters, described a series of experiments which he had made last year as to the cause of the brilliant blue colour so characteristic of the Mediterranean and the Lake of Geneva. Two distinct theories had been advanced. The one explained the colour as due to reflection from small suspended particles which did not reflect the lower rays of the spectrum; the other as the result of the absorbent action of the water itself upon the white light before and after reflection from these particles. The former was shown to be inconsistent with the facts established by experiment, which could be fully explained upon the latter theory. The greater the number of white reflecting particles the greener the water appears to be, a fact which sufficiently explains the gradual deepening of the green to blue as one recedes from the shore. The waters of the Lake of Como owe their darkness to the absence of reflecting particles, as Mr. Aitken very ingeniously proved by scattering finely divided chalk in the centre of the lake, thereby producing a most brilliant blue. The brilliancy depends greatly on the colour of the suspended particles; and observations in other parts of the earth's surface go far to show that great brilliancy is usually found where white sand lines the shore. Thus the dullness of tint in our waters is to be referred to the dull colour of the small suspended particles. The author had also extended his observations to spring water, which was found to vary greatly in colour from dingy yellow to emerald blue. The paper was illustrated by experiments bearing out the views expressed, and led to a considerable discussion amongst the Fellows.—The Rev. Prof. Duns, D.D., read a paper on the surface geology of Middle Lochaber, giving a description of the peat, sand, gravel heaps, angular *débris* and boulders, which occur between the rivers Spean and Nevis, and along the west slopes of the Nevis Mountains. The paper was chiefly devoted to the boulders, their mineral character, size, position, angle to horizon, and striation being particularly noted. It was shown that the peat had been formed after the deposit of the sands and gravels, that the boulders occur *on* not *in* the heaps, that the position of boulders in the plain may have as much significance as those on mountain slopes, that all the characteristic glacial markings abound in this district, and that the bulk of the phenomena may ultimately be explained by the recognition of two movements—one outwards from Ben Nevis as a centre, and another (and preceding) inwards from the west, north-west,

or north-north-west.—Prof. Chrystal, in some suggestive remarks on dielectric strength, pointed out the error into which certain experimenters had fallen in imagining that the dielectric strength of a medium is at all determined by the maximum difference of potential that could exist between two conductors placed in it, the truth being that it depends on the dielectric tension (in Faraday's sense), that is, upon the resultant electric force or surface density at the point of rupture; and, in reference to this, described some experiments which he had lately carried out in conjunction with Dr. Macfarlane. From these it appeared that the difference of potential necessary to make a spark pass between two charged balls was greater in the neighbourhood of a positively charged body, and less in the neighbourhood of a negatively charged body than when no such body was present. A strong magnetic field, on the contrary, had no effect on the dielectric strength of air, whether the lines of magnetic force were in the direction of or perpendicular to the direction of the electric force—even though the strength of the field was as much as 6000 absolute units. The main part of the paper was taken up with a discussion, from the Faraday and Maxwell point of view, of the experiments of Thomson, Macfarlane, De la Rue, and Baille. Amongst other theoretical considerations the effect of a particular variation in the specific inductive capacity was investigated. The "water-electrometer," with which he and Dr. Macfarlane had made some measurements last year, was referred to as being in all probability an effective and accurate instrument of research in electrostatic experiments—being at all events handier and more rapidly worked than an absolute electrometer of the ordinary construction. The results obtained by it he hoped ere long to lay before the Society.—A Latin diagnosis of new and little known phanerogamous plants collected in Socotra by Prof. Bayley Balfour was laid on the table.

PARIS

Academy of Sciences, February 20.—M. Jamin in the chair.—The following papers were read:—Meridian observations of small planets at Paris Observatory during the last quarter of 1881, by M. Mouchez.—On some applications of the theory of elliptic functions, by M. Hermite.—Double salts of mercury, by M. Berthelot. This relates to double iodides and chloroiodides.—Note on permanganate of potash considered as an antidote of snake poison, *apropos* of a publication of M. de Lacerda, by M. de Quatrefages. Vipers abound in Haute-Marne and some other departments in France (as is proved by the large numbers killed in consideration of a small premium on each viper). While the larger animals often recover from a bite, goats, sheep, and dogs often succumb. The effects on man, too, may be serious and even fatal. M. de Quatrefages desires the new method (some details of which he gives) to be made known. He also suggests it might be of use against the diseases treated by M. Pasteur.—Researches on a special influence of the nervous system causing the stoppage of exchanges between the blood and the tissues, by M. Brown-Séquard. Lesion of almost any part of the nervous system will cause this stoppage, which is more pronounced the more sudden the cause. The effects are chiefly these:—the venous blood becomes like arterial in colour; it holds less carbonic acid than normally; there are no convulsions before death; the body-temperature falls; the blood-vessels contract: after death, blood is found in the left heart, and the properties of the spinal cord, nerves and muscles, persist.—Action of high atmospheric pressures on the animal organism, by M. de Cyon. To M. Bert's apparatus he added arrangements for measuring the variations of blood-pressure, pulsations, and respiratory movements, and for stimulating sundry nerves. He finds that oxygen is not a special poison for the organism; animals die at high atmospheric pressures, simply because, the carbonic acid (the chief excitant of the vasomotor and respiratory centres), diminishing considerably, circulation and respiration stop; the former, because of too great lowering of blood-pressure; the latter, because of apnea. The heart-beats are accelerated for the same reasons; the oxygen increasing the action of the accelerating nerves, while the moderating action of the pneumogastric is lessened through failure of carbonic acid.—On the parasite of malaria, by M. Richard. This has been called by M. Laveran, *Oscillaria malariæ*. M. Richard has traced its development, in the red corpuscles, into a collar of dark granulations (displacing the hæmoglobin). Escaping, it appears like a flexible rod or whip; the thin end sometimes gets caught, and the organism then oscillates violently as if to free itself. In about an hour it dies. Generally, however, the parasite is inert. The parasiti-ferous corpuscles lose elasticity and become very viscous; hence they accumulate in the capillaries.—A new apterous male in Coccidians (*Acanthococcus auris*, Sign.), by M. Lichtenstein.—Observations of comet *b*=III. 1881, at Paris Observatory, by M. Bigourdan.—On the distribution of protuberances, faculæ, and solar spots, observed at Rome during the second and third quarters of 1881, by M. Tacchini. The faculæ extended to higher latitudes than in the first quarter; and protuberances were observed nearer the poles. In winter and summer a preponderance of protuberances appear in the south; in spring and autumn, in the north.—Solar spectroscopic observations at the Royal Observatory of the Roman College during the second and third quarters of 1881, by M. Tacchini. A continuous increase (not very rapid) of solar activity is indicated. In July the protuberances showed a secondary minimum, and the spots a maximum, and M. Tacchini attacks M. Faye's doubts as to this.—On the distribution, in the plane, of roots of an algebraic equation, of which the first member satisfies a linear differential equation of the second order, by M. Laguerre.—On the theory of uniform functions of a variable, by M. Mittag-Leffler.—On the integration of the equation $A\frac{d^n\phi}{dt^n} + \left(\frac{d^2}{dx^2} + \frac{d^2}{dy^2} + \dots\right)^n \phi = 0$.—On the practical solution of the problem of transport of force to great distances, by M. Levy. He proposes to have n generators connected in quantity, placed in n branch circuits, all connected with two points taken arbitrarily in the principal (biflar) circuit.—On the relative motion of the earth and the ether, by Mr. Michelson.—Compass without resistance, for measurement of intense currents, by MM. Terquem and Damien. This consists of a land-surveyor's compass, under which is a first band of copper for circulation of a current; under this a series of rectangular pieces of wood and other copper bands, the whole borne on a central rod. Two vertical bands bring the current into any one of the horizontal ones, according to the position in which you fix a peg.—Hydrodynamic experiments, &c. (continued), by Decharme.—On the saturation of phosphoric acid by bases and on chemical neutrality, by M. Joly.—On ferricyanhydric acid, by M. Joannis.—Action of iodine on naphtaline at a high temperature, by MM. Bleunard and Vrau.—On the blue and green coloration of dressings, by M. Gessard. He isolated the organism which produces the blue pigment (pyocyanine), and afterwards changes it to green.—Troubles of equilibration in young children deaf through otopiesis; their disappearance on return of hearing, by M. Boucheron.—On the evolution of teeth of Balænides, by MM. Pouchet and Chabon.—On the optical properties of crystalline bodies presenting the spherolithic form, by M. Bertrand.—M. Mouchez made some remarks on presenting a magnetic map of Russia by Col. de Tillo.

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